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An Investigation into Sleeping Patterns of Blind Children

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Abstract

Ten congenitally blind primary school children aged between 7 and 12 years were investigated and observed for a reduction or absence of photic input to the hypothalamus, which is required to entrain circadian rhythms which may lead to sleeping problems. As it was not clear whether sleeping problems are associated with blindness per se, other characteristics of the pupils and their social environment were taken into account. A group of 10 matched controls was observed. Interviews were conducted with parents and teachers of the 10 congenitally blind pupils, together with the matched controls. An interview schedule and self-report measures were used to collect information about the nature and type of sleep problems experienced by the children in this study, the parents' acceptance of their blind child, marital satisfaction, social support and parental stress. The study revealed that light has a significant role to play as an entrainment mechanism of circadian rhythms which have an effect on the quality of sleep. Results are discussed with reference to the application of a behavioural intervention approach (for example, a balanced diet, social support from both teachers and parents) with a view to improving sleeping problems in blind children.

Introduction

Scholl (1986), categorises visual disability into total blindness, low vision and partial sight. People with low vision are often referred to as legally blind while those born

without sight at all are referred to as the congenitally blind. The study focuses on the latter category.

Visual disability places the victim at a disadvantage in terms of mobility, communication, social behaviour, perception, concept formation, sensory stimulation, sleeping patterns and other skills (Ayoku, 1996). In this study an investigation into the sleeping patterns of congenitally blind pupils is made.

Recent studies have attempted to answer questions about blindness which have been the subject of scientific curiosity for many years. For instance "Do congenitally blind people have mental images? How are congenitally blind people sometimes able to detect an object without touching it? Does the absence or reduction of photic input to the hypothalamus have any effect on the circadian rhythms of blind people? Does this lead to sleeping problems?" It is often claimed that blindness may predispose individuals to disturbed sleep because light is an important mechanism for entraining circadian rhythms. It has been established that the absence of photic input in the hypothalamus (the part of the brain which coordinates the functions of the autonomic nervous system e.g. control of body temperature and emotions) leads to the decline in amplitude of circadian rhythms (Novikova, 1974).

Novikova (1974) in a study of sensory deficits in Moscow, found that the alpha (or circadian) rhythm is absent from most people who have been totally blind for several months or more. Immediately after sight is lost, the person retains an alpha rhythm, but this declines slowly in amplitude over the course of a few months, finally disappearing. This disappearance or absence of circadian rhythm suggests that in some way, the visual cortex changes as a result of blindness. The cause of the alpha rhythm is not very clear, but it reflects the intrinsic patterns of activity of resting cortical neurons in the

body. It is a known biological fact that it is such rhythm which determines the metabolic activity of waking and sleeping during the 24 hours of daily human behaviour. Circadian rhythms therefore regulate the behaviour and biochemistry of most living systems. The electrical activity of the brain is more rhythmical when one is awake and reacts less to outside stimuli during sleep.

Restricted visual (photic) input is a widespread cause of sleep disturbance among visually impaired people. The quality of sleep therefore depends on the activity of the brain and it is claimed that sleeping patterns of blind persons are different from those of sighted persons. Sleeping patterns are especially affected by changes in routine such as anxiety, depression or drug-taking as sometimes reflected in sleeping disorders which include insomnia, sleep-walking and nightmares. The above claims and these abnormal circadian activities, sleeping disorders, have been documented in several case reports (Nakagawa, 1992; Fouladi, Moseley, Jones & Tobin, 1994).

Previous epidemiological studies of sleep disturbance among blind persons have shown a higher prevalence of sleep disturbance than might be expected in sighted persons since it has been established that blind persons have a reduction or absence of photic input to the hypothalamus (Miles & Wilson, 1977). This study therefore sought to answer the following research questions:

1. Are sleeping problems associated with blindness?
2. What other characteristics in the environment should also be taken into account to determine sleeping patterns in congenitally blind children?

3. Does the absence or reduction of the photic input to the hypothalamus which is required to entrain circadian rhythms have an effect on the quality of sleep in congenitally blind pupils?

Research Design

An experimental and control group design which involved the comparison of the effects of being congenitally blind and of being sighted was used. The variables which determined item response such as quality of sleep, alertness, anxiety, tension, health and the extent of day-time napping were explicated from both the experimental and control group.

As it was not clear whether sleeping problems are associated with blindness per se, other characteristics of the pupils and their social environment were also taken into account. However, since it is well-documented that circadian rhythms are associated with sleep and are also said to be capable of entraining the sleep-wake cycle (Fouladi, Moseley, Jones & Tobin, 1998), the method used to extract information also took this phenomenon into account.

Sample

10 congenitally blind pupils at Margareth Hugo Primary School aged between 7 and 12 years between grade 2 and grade 7 were used as the sample for this study while a group of 10 matched sighted pupils from a neighbouring school were used as controls to contrast the visually blind pupils. The parents of congenitally blind pupils who lived within a radius of 50 kilometres from the school together with those of sighted pupils

and the teachers who taught these pupils were also included as part of the sample since their responses to specific research questions were also needed.

Instrumentation

Semi-structured interviews, self-report measures and observations were used to investigate the sleeping patterns of the pupils in this study. Semi structured interviews on sleeping patterns were also designed for both visually impaired pupils and sighted pupils. These pupils were interviewed on specific questions dealing with, the quality of sleep, the extent of day-time napping, alertness in class, anxiety, tension, life style activities and health issues.

In an attempt to strike a balance between the blind and sighted groups, observation techniques were also employed. Unlike interviews, where certain questions were directed at one particular group, but not the other, observation techniques used did not discriminate against any particular group as these focused on the activities of all subjects in the study.

Procedure

The researchers obtained permission from authorities at Margaretha Hugo School for the blind and a neighbouring school to conduct the survey among the two groups of pupils (that is, the congenitally blind and the sighted) together with their teachers. Six research assistants conducted interviews with the parents of the pupils in the survey. Each member of the two groups was given an assignment to take note of his or her sleeping patterns in the next five days and report to the researcher whether or not the quality of sleep had been typical or atypical of normal experiences. Focus was therefore

made on the subjects' experiences in the preceding 5 days. The haptic experiences of the congenitally blind were then compared with the experiences of the sighted. The parents of the children in the two groups were asked to record sleeping patterns of their children over the same period between 9pm and midnight. The parents were interviewed on their children's sleeping patterns using the criteria mentioned above. Demographic details of the parents, for example, the amount of social support received, parental stress, marital satisfaction and the acceptance of blind children by those whose children were born blind were also taken into account.

Analysis and Results

Data collected mainly through interview responses and self-report measures was content analysed using the qualitative method approach. The responses and reports given by the targeted pupils in this study, parents and teachers of their experiences in the previous 5 day period as requested by the researcher are as listed below:

Research Question 1: Are Sleeping Patterns Associated with Blindness?

Table 1
Sleeping Problems and Characteristics of the Environment Associated with Blindness

Reports by Pupils				
	Blind (n=10)	%	Sighted (n=10)	%
	Freq.		Freq.	
Good quality sleep	2	20	9	90
Disturbances during sleep	8	80	1	10
Tenseness upon awakening	7	70	2	20
Experience of nightmares	6	60	4	40
Ability to perceive light during the day	1	10	10	100
Involvement in sporting activities	3	30	8	80

In addition to the above reports, all the respondents maintained that the quality of their sleep in the previous 5 days had been typical of their usual sleep. It is clear from the above reports that congenitally blind pupils had a higher prevalence of sleep disturbances than their sighted counterparts. The 10% who had the ability to perceive light did not report any sleep disturbances. Therefore sleeping problems are associated with blindness.

In relation to general lifestyles which include involvement in sporting activities and exercise, only 30% of the congenitally blind pupils claimed that they were involved. The same 30% were also identified as pupils who had slightly better quality of sleep when compared to their other blind counterparts. They reported that they did not experience nightmares or tenseness upon awakening.

Research Question 2: What other Characteristics in the Environment should also be taken into Account to Determine Sleeping Patterns in Congenitally Blind Children?

Table 2
Characteristics which determine Sleeping Patterns

Reports by Teachers of Targeted Pupils				
	Blind (n=10)	%	Sighted (n=10)	%
History of insomnia or other sleep related problems	8	80	4	40
Good social environment	6	60	8	80
Involvement in sporting activities or exercise	2	20	8	80
Extent of day-time napping	7	70	2	20
Parental stress experiences	7	70	4	40

Reports given by parents about the sleeping patterns of their children revealed that 80% of the congenitally blind children had a history of insomnia and other sleep-related problems such as sleep-walking and bed-wetting during sleep while only 40% of pupils in the control group suffered the same suggesting a higher prevalence of sleep disturbances among the blind. The social environment in which both groups of blind and sighted pupils were being brought up was considered to be satisfactory (60% and 80% respectively) as the blind were being provided with social support by authorities, had a balanced diet and were also included in mainstream classes in order to fit into the environment of their sighted counterparts. Only 20% of the congenitally blind pupils were involved in sporting activities and other exercises. Comparisons made from the reports given by the parents of the blind children revealed that those who were active in sports or exercise had less sleep disturbances on the whole.

Research Question 3: Does the Absence or reduction of the photic input to the hypothalamus which is Required to Entrain Circadian Rhythms have an Effect on the Quality of Sleep in Congenitally Blind Pupils?

In an attempt to answer the question pertaining to whether the absence or reduction of the photic input to the hypothalamus which is required to entrain circadian rhythms which may lead to sleeping problems, teachers of congenitally blind pupils were asked to give a report on their observations during classes. It was reported that 70% of blind pupils were caught napping during the day unlike only 20% of the sighted pupils. Among the parents of the blind 70%, reported experiencing stress and other emotions that upset the equilibrium of these blind pupils, whereas only 40% of the parents of sighted pupils had similar experiences. It was noted that parents who suffered from stress also experienced a rather weak marital satisfaction and this had an effect on how they accepted their blind child. Among the parents who claimed to have accepted their

blind child, there seemed to be marital satisfaction and less parental stress. From the reports given by this latter group it seemed that they interacted with their blind children better than the former group.

Table 3
Effects of Absence of Photic Input on Quality of Sleep

Reports by Teachers of Targeted Pupils				
	Blind (n=10)	%	Sighted (n=10)	%
Interference with performance in class	5	50	4	40
Day time napping	7	70	3	30
Alertness in class	4	40	8	80
Involvement in sporting activities	3	30	9	90
Anxieties and tensions	6	60	3	30

Teachers of blind children reported that they did all they could to assist the blind children to integrate with mainstream children and that sometimes they would go out of their way to ensure that this is done even in cases where mobility equipment was not readily available. When asked for their views on whether their children's visual impairment interfered with their performance in class when compared with the performance of the sighted, 50% thought that it did unlike the 40% who thought that being sighted also interfered with performance in class.

Teachers reported that they caught more blind pupils (70%) napping in class during lessons than sighted pupils (30%) over the 5 day period they had been asked to record events for this study, an indication that the blind had more sleeping problems than the sighted. When it came to alertness in class, there were fewer blind pupils (40%) who were reported to be alert when compared to sighted pupils (80%). Only 30% of blind

pupils were reported to be active in sports or in other forms of exercise, unlike 90% of their sighted counterparts. The teachers noticed that anxieties and tensions were high among the blind pupils (60%) when compared with sighted pupils (30%).

Discussion

Although the sample used for this study was small (due to the restricted number of congenitally blind pupils at the school) it is the belief of the researcher that the results obtained and the deductions made from this study will not differ significantly from that of a larger population. Clearly, the findings of this study however, do not rule out the possibility that sleep disturbances reported by a small sample of respondents are attributable to circadian rhythm abnormalities. The variables used in this study to determine the quality of sleep, for example, the ability to perceive light, exercise, alertness, anxiety and tension have all been found by other researchers to be associated with quality of sleep. In this study, only 10% of the congenitally blind pupils could perceive light. On close scrutiny, no sleep disturbances were reported in this particular case, thus reinforcing the notion established by Nokinova (1974) and Nakagawa (1992) that light has a significant role to play as an entrainment mechanism of circadian rhythms which have an effect on the quality of sleep. 90% of the congenitally blind who also reported sleep disturbances had no perception of light at all. Since most blind persons have no perception of light, it may be predicted that visually impaired individuals in whom photic stimulation to the hypothalamus is either non-existent or reduced, will have abnormal circadian activity which leads to sleeping disorders. It is clear from the findings of this study that sleeping problems are associated with blindness and that there are other characteristics of the environment which affect the quality of sleep. Above all, the absence or reduction of a photic input to the hypothalamus also leads to sleeping problems.

Conclusion

Although it cannot be conclusively established what the causal factors of sleeping problems are from the foregoing account, it can be seen that there are certain factors which are characteristic of blind persons which can be associated with sleeping problems. For instance, perception of light and exercise have been found to be essential elements that may reduce sleep problems. Without these, blind persons are likely to experience sleep disturbances as both light and exercise are important mechanisms for entraining circadian rhythms which may lead to sleeping problems. Other recommended factors include a good social environment, a balanced diet, parental support, social support, acceptance by parents of their blind child, marital satisfaction, reduced parental stress and assistance from teachers also contribute towards better sleep patterns of blind children.

This study therefore shows that the application of a intervention approach (such as getting blind children to exercise more as well as to follow the other recommendations outlined above) will improve sleeping problems in blind children. With improved sleeping patterns, there is no doubt that the children's alertness and performance in class will also improve. It has however been difficult to show conclusive evidence on some of the claims made above due to the small sample size which affects the reliability of self-report measures. This study therefore merits further enquiry.

References

- Ayoku, F. A. (1996). *Community Involvement in the Education of the Visually Handicapped in Nigeria: Exceptional Children in the Community*. Ibadan, N.C.E.C.
- Fouludi, K. M, Moseley, J. M. & Tobin, M. J. (1998). Sleep Disturbances among Persons who are Visually Impaired, *Journal of Visual Impairment and Blindness*, 1, 1, pp. 522-529.
- Miles, L. E. M. & Wilson, M. A. (1977). High Incidence of Cyclic Sleep/Wake Disorders in the Blind, *Sleep Research*, 6, p. 192.
- Nakagawa, H. (1992). Sleep Propensity Free-runs With Temperature Melatonin and Cortisol Rhythms in a Totally Blind Person, *Sleep*, 15, pp. 330-336.
- Novikova, L. A. (1974). *Blindness and the Electrical Activity of the Brain*. New York: American Foundation for Blind.



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